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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/704,366	11/01/2000	Thomas Fechner	3926.017	4892

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EXAMINER

LU, TOM Y

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 02/27/2004

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/704,366

Applicant(s)

FECHNER ET AL.

Examiner

Tom Y Lu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 1-24 are rejected under 35 U.S.C. 2nd Paragraph for insufficient antecedent basis for limitations in the claims.

- a. Claim 1 recites the limitations “the morphological characteristics” and “the basis of a priori knowledge” in lines 3-4.
- b. Claim 2 recites the limitation "the totality of the image data" in line 2.
- c. Claim 3 recites the limitation "the input of the camera geometry", “the geometry of the vehicle track”, “the dimensions of the vehicle lane markings” and “the vehicle position” in lines 3-4.
- d. Claim 4 recites the limitation "the initialization of the process for recognition" in line 2.
- e. Claim 5 recites the limitation "the model parameter", “the orientation of the camera”, “the center of the vehicle” and “the yaw angle of the vehicle” in lines 2-4.
- f. Claim 6 recites the limitation "the already initialized ROI parameter predictions" in lines 2-3.
- g. Claim 7 is rejected as being dependent upon defective claims.
- h. Claim 8 recites the limitation "the variation of the result values" in line 3.
- i. Claims 9-13 are rejected as being dependent upon defective claims.

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- j. Claim 14 recites the limitation "the x-y components" in line 3.
 - k. Claim 15 recites the limitations "the framework" and "the gray value" in lines 2 and 9.
 - l. Claims 16-17 are rejected as being dependent upon defective claims.
 - m. Claim 18 recites the limitation "the background noise" in line 3.
 - n. Claim 19 is rejected as being dependent upon defective claims.
 - o. Claim 20 recites the limitation "the subsequent digitization" in line 4.
 - p. Claim 21 recites the limitations "the size", "the roundness", "the distribution", "the case", "the number" and "the criteria" in lines 4-8.
 - q. Claim 22 is rejected as being dependent upon defective claims.
 - r. Claim 23 recites the limitation "the center of gravity" in line 3.
 - s. Claim 24 is rejected as being dependent upon defective claims.
2. Claims 2-19 and 21-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
- a. Referring to Claim 2, the examiner is not clear whether to consider the limitation in the parenthesis as a part of the claim. Correction is advised. In addition,
 - b. Claims 3-9 are rejected as being dependent upon Claim 2.
 - c. Claim 10 is rejected for the same reason given in Claim 2.
 - d. Claim 11 is rejected as being dependent upon Claim 2.
 - e. Claim 12 is rejected for the same reason given in Claim 2.
 - f. Claims 13-18 are rejected as being dependent upon Claim 12.

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- g. Claim 19 is rejected for the same reason given in Claim 2.
 - h. Claim 21 is rejected for the same reason given in Claim 2.
 - i. Claims 22-23 are rejected as being dependent upon Claim 21.
 - j. Claim 24 is rejected for the same reason given in Claim 2.
3. Regarding claim 24, the phrase "for example" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).
4. Regarding claims 3, 5 and 21 the phrase "and/or" renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "or "), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

Drawings

5. The drawings are objected to because figures 2 and 3 fail to show drawing descriptions. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Kenue (U.S. Patent No. 4,970,653).

- a. Referring to Claim 1, Kenue discloses process for recognition (column 2, line 40, algorithm) of vehicle lane markings (column 2, line 45, lane markers) from image data (column 2, line 41, the images sensed by the camera), wherein the morphological characteristics of dot-shaped vehicle lane markings (column 2, line 54 and 57, lane markers 24, and lane boundary information) are evaluated on the basis of a priori knowledge (column 2, line 60, range estimation is a priori knowledge. Also see column 7, line 51).
- b. Referring to Claim 2, Kenue discloses wherein from the totality of the image data, areas are extracted from processing, in which vehicle lane markings are contained with high probability based upon a priori knowledge (Kenue at column 2, lines 45-48, teaches defining the search area for lane markers based on the lane boundaries of the previous frame, and the lane boundaries of the first frame is based on the “a priori knowledge” range estimation and reference markers derived from the special calibration procedure as described at column 2, lines 59-66).
- c. Referring to Claim 3, Kenue discloses wherein the a priori knowledge is based upon the input of the camera geometry and/or the geometry of the vehicle track and/or the dimensions of the vehicle lane markings and/or the vehicle position (column 2, lines 63-64, the positions of the actual markers and the images of these markers are to be considered as the claimed “input of camera geometry and the geometry of the vehicle track”).
- d. Referring to Claim 4, Kenue discloses wherein in the initialization of the process for recognition of vehicle lane markings model parameters are varied at random

sequence so long until vehicle lane markings are found (Kenue at column 2, lines 59-67, teaches the special calibration procedure enables range estimation, and such estimation is to recognize an initial set of lane boundaries, which requires calibration parameters at random sequence until the reference markers are determined).

- e. Referring to Claim 5, Kenue discloses wherein the model parameter draws upon the width of the vehicle lane and/or the orientation of the camera with respect to the center of the vehicle lane and/or the yaw angle of the vehicle (column 2, lines 60-61, the calibration is based on known characteristics of the road and camera. The width of the lane, and orientation of the camera are all considered as characteristics of the road and camera).
- f. Referring to Claim 6, Kenue discloses wherein for repositioning of the already initialized ROI parameter predictions, a vehicle street model based on a prediction of an evaluation process is drawn upon for parameter determination (column 4, line 27, the search area changes with marker position MP, also see column 5, lines 35-36 and 49-50).
- g. Referring to Claim 7, Kenue discloses wherein the evaluation process for parameter determination is based upon a Kalman-filter (column 5, line 55).
- h. Referring to Claim 8, Kenue discloses wherein in the repositioning of the ROI, its values are controlled by the variation of the result values of the prediction of the Kalman-filter, when the width is adapted proportionally to the size of the variation of the results (column 5, lines 51-62).

- i. Referring to Claim 9, Kenue discloses wherein the ROI is limited vertically on the basis of a minimal and a maximal distance in the street plane (column 5, line 35-42).
- j. Referring to Claim 10, Kenue discloses wherein in application of the process at night, the vertical limitation of the ROI is determined by the area of the maximal illumination (column 6, lines 53-57).
- k. Referring to Claim 11, Kenue discloses wherein the limitation is controlled by the number of the image points expected to be associated with the vehicle lane marker, and this control or regulation is optimal when the number of image points to be expected is constant for all distance ranges (column 5, lines 35-42).
- l. Referring to Claim 12, Kenue discloses wherein for processing of the area extracted from the image data, a matched-filter is employed in order to extract image points, which area associated with vehicle lane markers (column 4, line 49, template matching operation).
- m. Referring to Claim 13, Kenue discloses wherein the matched-filter is adapted in shape and size to the vehicle lane marking being searched for and/or to the statistic of the background (column 4, lines 49-67, and column 5, lines 1-18).
- n. Referring to Claim 14, Kenue discloses wherein the matched-filter is implemented in separate form, in which the x-y components are presented separately (column 4, lines 54-58).
- o. Referring to Claim 15, Kenue discloses wherein the framework of the use or application of the matched-filter (template matching algorithm, column 3, line

22), the average gray value of the background in the environment of the position to be examiner is measured, and that upon the presentation of an image point, which is potentially to be associated with the vehicle lane marking, is closed or enclosed or concentrated on the basis of a comparison between background noise, the average gray value in the environment, and the gray value of the position to be examined (column 3, line 49-56).

- p. Referring to Claim 16, Kenue discloses wherein in the evaluation of the matched-filter, only the x-component is evaluated (column 4, line 55-56, correlation is the claimed “evaluation” in horizontal direction).
- q. Referring to Claim 17, Kenue discloses wherein after the extraction of the image points, which are to be associated with vehicle lane markings, these are digitized, wherein the intensities of the individual pixels are compared with a threshold value, and the pixels are only then drawn upon for further evaluation when their intensity exceeds this threshold (column 6, line 57, 20% of the maximum intensity is the claimed “threshold”).
- r. Referring to Claim 18, Kenue discloses wherein the threshold value is determined from the background noise using a threshold value regulator or controller (column 7, lines 11-17).
- s. Referring to Claim 19, Kenue discloses wherein the threshold value regulator draws upon a priori knowledge regarding the expected surfaces occupied by the vehicle lane markings, which are directly correlated with the expected number of image points associated with the vehicle lane markings, and wherein the threshold

value regulator or controller thereupon aims to supply the number of the image points extracted in the ROI preferably exactly to this expected value (column 6, lines 47-67).

- t. Referring to Claim 20, Kenue discloses wherein after the extraction of image points potentially belonging to a vehicle lane marker and the subsequent digitization, these image points are collected for the further processing into marker objects (column 7, lines 24-27).
- u. Referring to Claim 21, Kenue discloses wherein in the evaluation of the morphological characteristics of the vehicle lane marker, the size of the marking object and/or the roundness of the pixel group and/or the distribution of the pixels or, as the case may be, the number of empty space within the pixel group is evaluated with respect to whether they satisfy the criteria of a vehicle lane marker defined in accordance with a priori knowledge (column 6, lines 47-67).
- v. Referring to Claim 22, Kenue discloses wherein each pixel group, which satisfies the criteria of a vehicle lane marker, is considered to be an actual marker object and is characterized by its image coordinates (column 6, lines 64-67 and column 7, lines 1-6).
- w. Referring to Claim 23, Kenue discloses wherein as characterizing image coordinates, the coordinates of the center of gravity of the pixel group associated with the marking object is selected (column 7, lines 4-6).
- x. Referring to Claim 24, wherein the characteristic image coordinates of the marking object are employed in order with curve regression to describe the

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boundaries of the own vehicle lane with respect to the course of the vehicle track, as well as to describe the own position with respect to the vehicle lane center, and that this description is provided to an estimation process for parameter determination for repositioning of the ROI within the image data (column 7, lines 24-37).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Iisaka et al, U.S. Patent No. 5,904,725, see figures 3-6 and 16.
- b. Shima et al, U.S. Patent No. 5,555,312, see figures 8 and 14.
- c. Hasegawa et al, U.S. Patent No. 5,247,587, see columns 4-5.
- d. Unoura, U.S. Patent No. 5,517,412, see figure 5.

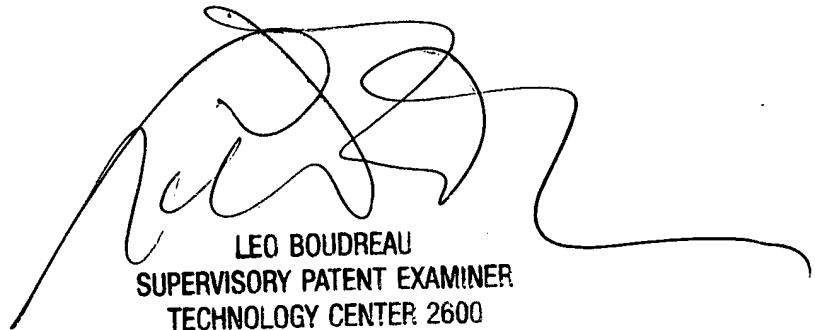
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y Lu whose telephone number is (703) 306-4057. The examiner can normally be reached on 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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